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(54) Machine for cutting sheet metal and similar

(57) A machine (1) for cutting sheet metal (5), and having two adjacent worktables (2), each with a respective sheet (5) handling device (4); the machine also comprising a cutting unit (3) with a cutting head (9) alternately movable over the two worktables (2) to cut

the sheet (5) on one of the two worktables (2) while the handling device (4) of the other worktable (2) replaces the worked sheet (5) with an unworked sheet (5).

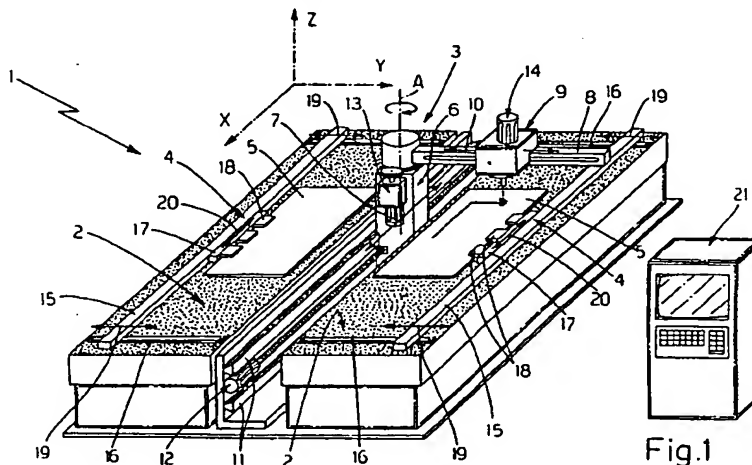


Fig.1

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Description

[0001] The present invention relates to a machine for cutting sheet metal and similar.

[0002] Currently used sheet metal cutting machines comprise a worktable; a sheet cutting unit (normally using a laser or a water cutter) movable over the worktable; and a sheet handling device for successively positioning the sheet on the worktable, holding the sheet on the worktable as it is cut by the cutting unit, and finally unloading the worked sheet off the worktable.

[0003] Known machines also comprise a control unit for so controlling the handling device and the cutting unit as to cut the sheets in series. Naturally, the type of cut made in each sheet depends on how the cutting unit is moved over the worktable by the control unit.

[0004] A major drawback of machines of the above type is the low output rate. In fact, the total work time for each sheet is seriously affected by the time taken to position the sheet within the operating area of the cutting unit on the worktable, and to unload the sheet off the worktable once it is cut; which transfer times are at least comparable with the time taken to actually cut the sheet, so that the cutting unit is left idle for large part of the total work time.

[0005] It is an object of the present invention to provide a sheet metal cutting machine designed to ensure greater output per unit of time.

[0006] According to the present invention, there is provided a machine for cutting sheet metal and similar, and comprising a first worktable; a first handling device for positioning at least one sheet on said first worktable; and a cutting unit comprising at least one cutting head movable over said first worktable to cut the sheet positioned thereon; the machine being characterized by comprising a second worktable alongside said first worktable; and a second handling device for positioning at least one sheet on said second worktable; the cutting head of said cutting unit being selectively positionable over said first or said second worktable to cut the corresponding sheet while the handling device of the other of said first and second worktables provides for replacing the worked sheet with an unworked sheet.

[0007] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a view in perspective, with parts removed for clarity, of a machine for cutting sheet metal and similar in accordance with the teachings of the present invention;

Figures 2 and 3 show views in perspective, with parts removed for clarity, of respective variations of the Figure 1 machine.

[0008] Number 1 in Figure 1 indicates as a whole a machine for cutting sheet metal and similar.

[0009] Machine 1 comprises two adjacent worktables

2; a sheet cutting unit 3 movable over both worktables 2; and two sheet handling devices 4, each of which provides for successively positioning a sheet 5 on respective worktable 2, holding sheet 5 on worktable 2 as cutting unit 3 performs the programmed job, and finally unloading the worked sheet 5 off worktable 2.

[0010] Cutting unit 3 in turn comprises an upright 6 movable horizontally between the two worktables in a direction 7 parallel to a first horizontal reference axis hereinafter referred to as the X axis; a supporting arm 8 extending from the top end of upright 6 in a direction parallel to a second horizontal reference axis perpendicular to the X axis and hereinafter referred to as the Y axis; and a known cutting head 9 fitted to arm 8 so as to move in a direction 10 parallel to the Y axis to cut sheets 5 using, preferably but not necessarily, a laser beam or water cutter.

[0011] As shown in Figure 1, upright 6 slides along a pair of horizontal guides 11 extending in direction 7 between the two worktable 2; and arm 8 is fitted to the top end of upright 6 so as to rotate about a vertical axis A parallel to a third reference axis perpendicular to axes X and Y.

[0012] Cutting unit 3 also comprises a first actuating device 12 for moving upright 6 along horizontal guides 11 in direction 7; a second actuating device 13 for rotating arm 8 through 180° about vertical axis A to selectively position cutting head 9 over either of the two worktables 2; and a third actuating device 14 for moving cutting head 9 along arm 8 in direction 10.

[0013] Each handling device 4 is movable over respective worktable 2, and comprises a carriage 15 extending parallel to the X axis over worktable 2 and sliding along longitudinal guides 16 extending parallel to the Y axis over a portion of worktable 2; a gripping device 17 sliding along carriage 15 and having a number of grippers 18 for gripping sheets 5; and two actuating devices (not shown) for respectively moving carriage 15 in a direction 19 parallel to the Y axis, and moving gripping device 17 along carriage 15 in a direction 20 parallel to the X axis.

[0014] Machine 1 also comprises a control unit 21 for so controlling cutting unit 3 and handling devices 4 as to enable cutting head 9 to work alternately on the two worktables 2.

[0015] Operation of machine 1 will now be described, assuming an unworked sheet 5 is stationary on the first worktable 2, beneath cutting head 9, and a worked sheet 5 is stationary on the second worktable 2.

[0016] In actual use, control unit 21 moves cutting head 9 over the first worktable 2 to cut the sheet 5 on the first worktable, and at the same time controls the handling device 4 of the second worktable 2 to replace the worked sheet 5 on the second worktable with an unworked sheet 5. Once the sheet 5 on the first worktable 2 has been cut, control unit 21 rotates arm 8 about axis A to position cutting head 9 over the second worktable 2 and so proceed to cut the new sheet 5.

[0017] Figure 2 shows a first variation of machine 1, wherein supporting arm 8 is integral with upright 6 and extends, parallel to the Y axis, over both worktables 2; and cutting head 9 is movable along the whole length of arm 8 and therefore positionable over either one of worktables 2.

[0018] Figure 3 shows a further variation of machine 1, wherein upright 6 is replaced by a gantry 22 fixed between the two worktables 2 and having a crosspiece 23 extending parallel to the X axis; supporting arm 8 extends, parallel to the Y axis, over both worktables 2, and slides along crosspiece 23 in a direction 24 parallel to the X axis; cutting unit 3 comprises an actuating device 25 for moving arm 8 in direction 24; and cutting head 9 is movable along the whole length of arm 8 and therefore positionable over either one of worktables 2.

[0019] Machine 1 as described and illustrated herein has the important advantage of overlapping the work cycles of sheets 5 to fully exploit cutting head 9 and so achieve a considerable increase in production output per unit of time.

[0020] Clearly, changes may be made to machine 1 as described and illustrated herein without, however, departing from the scope of the present invention.

Claims

1. A machine (1) for cutting sheet metal (5) and similar, and comprising a first worktable (2); a first handling device (4) for positioning at least one sheet (5) on said first worktable (2); and a cutting unit (3) comprising at least one cutting head (9) movable over said first worktable (2) to cut the sheet (5) positioned thereon; the machine being characterized by comprising a second worktable (2) alongside said first worktable (2); and a second handling device (4) for positioning at least one sheet (5) on said second worktable (2); the cutting head (9) of said cutting unit (3) being selectively positionable over said first or said second worktable (2) to cut the corresponding sheet (5) while the handling device (4) of the other of said first (2) and second (2) worktables provides for replacing the worked sheet (5) with an unworked sheet (5).
2. A machine as claimed in Claim 1, characterized in that said cutting unit comprises an upright (6) movable between said first (2) and said second worktable (2) in a first direction (7) parallel to a first horizontal reference axis (X); and a supporting arm (8) which is fitted to said upright (6), and extends selectively over said first (2) or said second (2) worktable in a direction parallel to a second horizontal reference axis (Y) perpendicular to said first horizontal reference axis (X); said cutting head (9) being movable along said supporting arm (8) in a second direction (10) parallel to said second horizontal reference axis (Y); and said supporting arm (8) being fitted to said upright (6) so as to rotate about a vertical axis (A).
3. A machine as claimed in Claim 2, characterized in that said cutting unit (3) comprises orienting means (13) for selectively rotating said supporting arm (8) through 180° about said vertical axis (A) to alternately position the supporting arm over said first (2) or said second (2) worktable.
4. A machine as claimed in Claim 1, characterized in that said cutting unit comprises an upright (6) movable between said first (2) and said second (2) worktable in a first direction (7) parallel to a first horizontal reference axis (X); and a supporting arm (8) which is fitted to the upright (6), and extends over said first (2) and said second (2) worktable in a direction parallel to a second horizontal reference axis (Y) perpendicular to said first horizontal reference axis (X); said cutting head (9) being movable along said supporting arm (8) in a second direction (10) parallel to said second horizontal reference axis (Y).
5. A machine as claimed in any one of the foregoing Claims, characterized in that said cutting unit (3) comprises first actuating means (12) for moving said upright (6) in said first direction (7); and second actuating means (14) for moving said cutting head (9) along said supporting arm (8) in said second direction (10).
6. A machine as claimed in Claim 1, characterized in that said cutting unit comprises a gantry (22) located between said first (2) and said second (2) worktable and having a crosspiece (23) parallel to a first horizontal reference axis (X); and a supporting arm (8) fitted to said crosspiece (23) so as to slide in a first direction (24) parallel to a first horizontal reference axis (X); said supporting arm (8) extending parallel to a second horizontal reference axis (Y) perpendicular to said first horizontal reference axis (X); and said cutting head (9) being movable along said supporting arm (8) in a second direction (10) parallel to said second horizontal reference axis (Y).
7. A machine as claimed in Claim 6, characterized in that said cutting unit (3) comprises first actuating means (25) for moving said supporting arm (8) along said crosspiece (23) in said first direction (24); and second actuating means (14) for moving said cutting head (9) along said supporting arm (8) in said second direction (10).
8. A machine as claimed in any one of the foregoing Claims, characterized in that said cutting head (9) uses a laser beam for cutting said sheet (5).

9. A machine as claimed in any one of the foregoing Claims from 1 to 7, characterized in that said cutting head (9) uses a water cutter for cutting said sheet (5).

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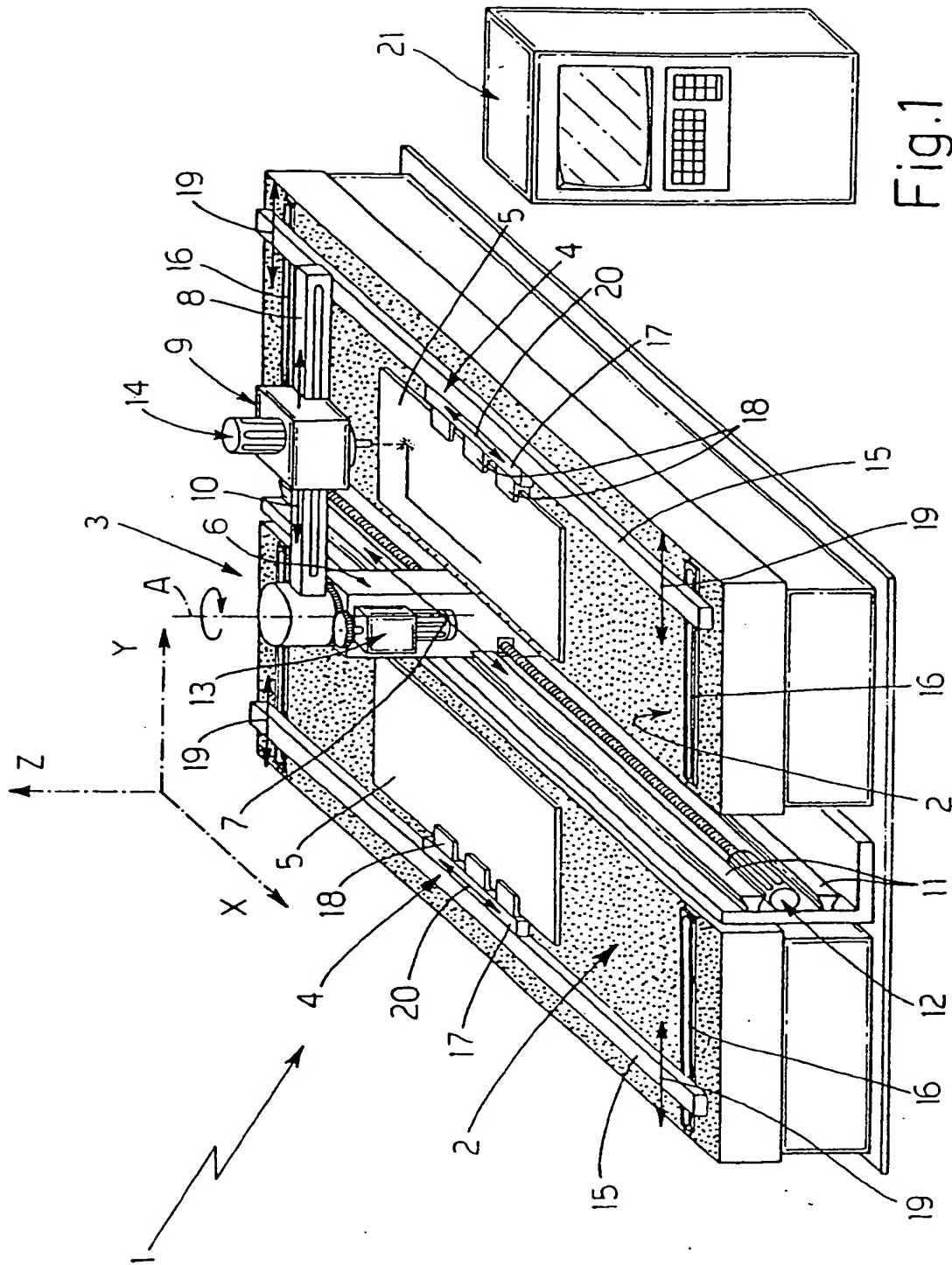
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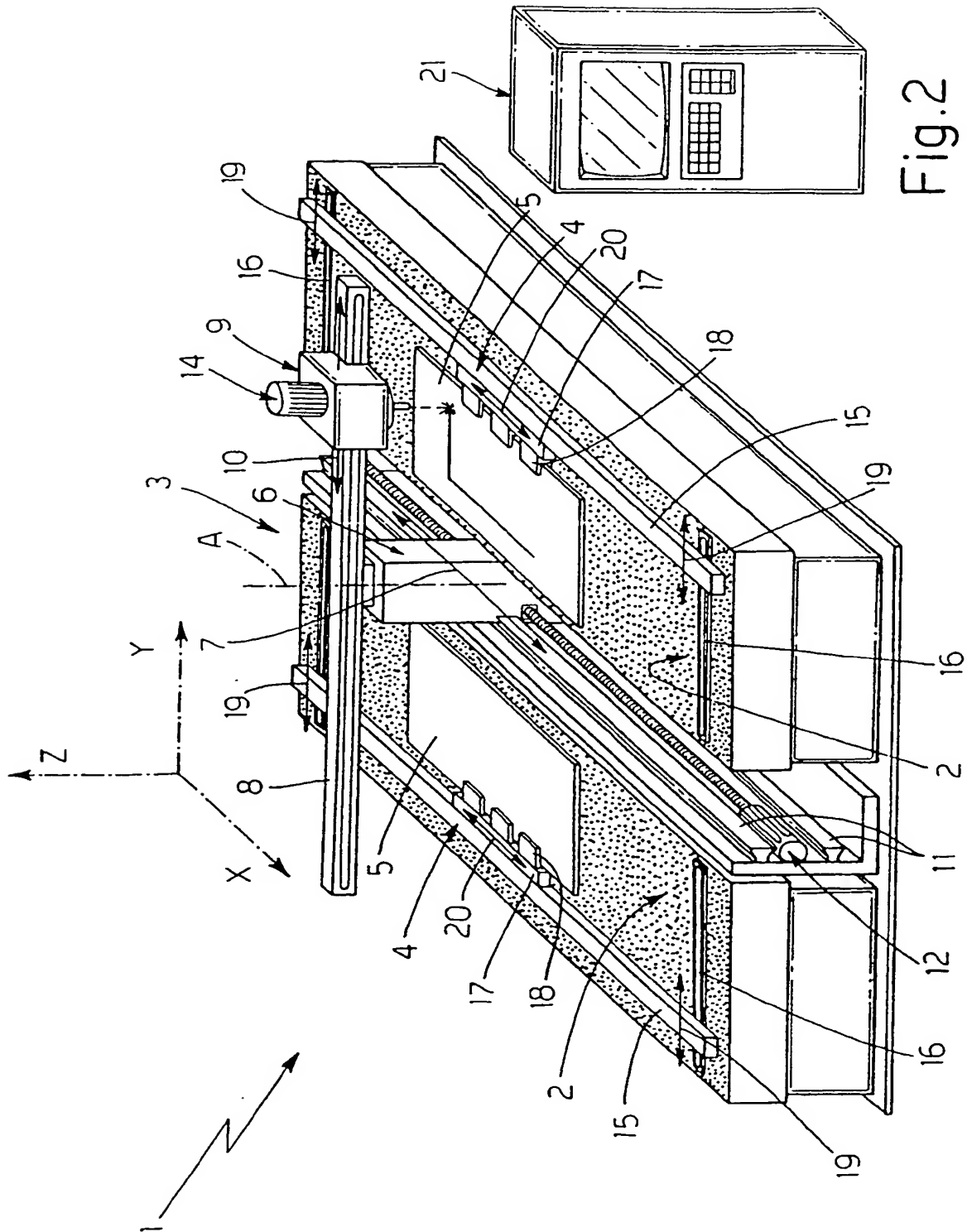
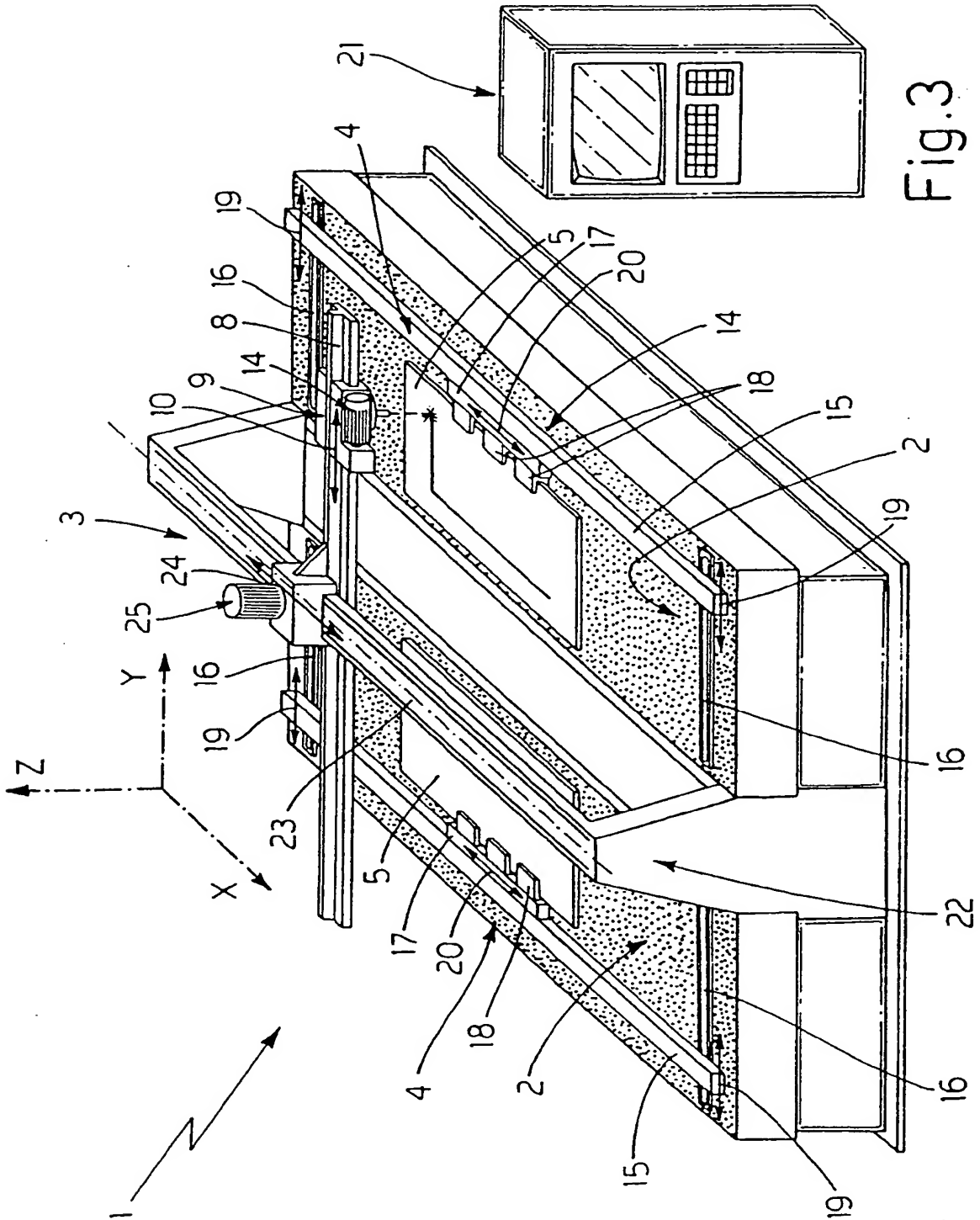


Fig. 2





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EUROPEAN SEARCH REPORT

Application Number
EP 97 83 0565

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP 0 776 725 A (MISUGI)	1,8	B23K26/10
Y	* page 3, column 1, line 25 - page 4, column 2, line 2; figures 1-5 *	4,5	B26F3/00
Y	EP 0 321 686 A (MUELLER) * page 2, column 2, line 29 - page 4, column 5, line 42; figures 1-3 *	4,5	
A	DE 30 26 932 A (ITOH)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B23K B26F B26D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 March 1998	Examiner Berghmans, H
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X particularly relevant if taken alone Y particularly relevant if combined with another document of the same category A technological background O non written disclosure P intermediate document</p> <p>T theory or principle underlying the invention E earlier patent document, but published on, or after the filing date D document cited in the application L document cited for other reasons & member of the same patent family, corresponding document</p>			

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